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A comparative study of menstrual poverty among urban and rural female learners in government schools of Zambia

Bwalya Bupe Bwalya[1,2*], Ancietos Mwansa[3], Patrick Amanzi[4], Christabel Ngongola[1] and Charity Meki-Kombe[5]

Abstract

Background Menstrual poverty remains a significant health problem among female learners in Zambia, particularly due to the lack of access to menstrual products, leading to the use of unsafe alternatives and potential health risks such as reproductive tract infections. To address this pressing issue, this study examined the disparities in knowledge, attitudes, and practices concerning menstrual poverty among female learners in both urban and rural government schools within Zambia.

Methods The study utilized a mixed-method sequential explanatory design, combining quantitative and qualitative approaches. A cross-sectional survey of 447 female learners was conducted in urban and rural areas using a multistage stratified sampling approach. Quantitative data were analysed using descriptive and bivariate techniques in Stata version 14.2. The qualitative arm consisted of focus group discussions and key informant interviews, with thematic analysis applied.

Results The findings revealed that urban female learners possessed a more comprehensive understanding of menstruation than their rural peers, with a significantly higher proportion accurately defining the process (74% vs. 50%). Notably, both urban and rural learners experienced a spectrum of emotional responses to menarche, with fear and discomfort common among learners in both urban and rural settings, while support-seeking behaviours and cultural beliefs varied geographically. Rural learners commonly turned to herbal remedies for menstrual management (30% vs. 21%, $p=0.007$). Furthermore, over 50% of urban and rural leaners reported dissatisfaction with the sanitary facilities, citing concerns such as cleanliness, privacy, and inadequate handwashing amenities.

Conclusion This study reveals significant disparities in menstrual knowledge, practices, and attitudes between urban and rural female learners. Government funding is imperative to implement comprehensive menstrual health education in all public schools to create a supportive environment for menstruating learners. Collaboration with the Ministry of Health is crucial to ensure access to essential resources, including pain relief and gender-sensitive facilities.

Keywords Menstrual poverty, Female learners, Rural, Urban, Schools, Zambia

*Correspondence:
Bwalya Bupe Bwalya
bwalya1983@gmail.com
[1]Department of Economics, School of Social Science, Mulungushi University, Kabwe, Zambia
[2]Demography and Population Studies Programme, Schools of Public Health and Social Sciences, University of the Witwatersrand, Johannesburg, South Africa
[3]Department of Political and Administrative Studies, School of Social Sciences, Mulungushi University, Kabwe, Zambia
[4]Public Health Surveillance, Health Information Systems Programme, Lusaka, Zambia
[5]Directorate of Research and Postgraduate Studies, Mulungushi University, Kabwe, Zambia

Introduction

Globally, menstrual poverty affects approximately 800 million menstruating women and girls, with developing countries bearing the brunt of this issue [1]. In Sub-Saharan Africa (SSA), including Zambia, this problem is particularly acute, hindering learners' education and well-being [2, 3]. The United Nations estimates that, one in every ten learners misses school whilst menstruating in SSA, resulting from insufficient access to menstrual products or appropriate facilities such as toilets for learners to change their pads during menstruation whilst attending school. For those who persevere and return to school, about 20% more years of schooling are added to the normal number required to be in school, thereby falling behind their male counterparts of the same age [4]. Menstrual poverty, defined as inadequate access to menstrual hygiene information, products, and facilities, leads to missed school days, health risks, and social stigma [3, 5, 6]. As a result, girls face significant challenges in staying in school and achieving educational parity with their male counterparts [7, 8]. Moreover, recognizing the far-reaching consequences of menstrual poverty, the United Nations has linked it to several Sustainable Development Goals (SDGs) 1, 3, 4, 5, 6 and 10 [8], emphasizing the need for comprehensive solutions [9].

Zambia is a country where menstrual poverty is a prevalent issue, exacerbated by social and cultural taboos surrounding menstruation [10, 11], limited access to menstrual hygiene management (MHM) information [12], facilities, and products, coupled with inadequate water, sanitation, and hygiene (WASH) facilities, and privacy concerns, poses significant challenges for female learners in both urban and rural schools [13, 14]. In cases where students have access to menstruation products, they are frequently insufficient to last the whole period, particularly in rural schools [15]. In rural areas, the situation is worse, with students using unhygienic alternatives like mattress fabric or diapers [16] resulting from lack of affordable and accessible menstrual products, increasing their risk of reproductive tract infections and long term infertility [11, 12].

The Zambian government, in collaboration with various stakeholders, has been actively promoting MHM education in schools since 2015 [17, 18]. This includes providing menstrual products, sanitation facilities, and MHM education. While significant progress has been made, the 2020 Education Statistics Bulletin revealed gaps in MHM education and product availability [19]. Only 68.1% of schools offered MHM education, and only 35.4% provided sanitary pads. Furthermore, the provision of disposable facilities for used sanitary pads remains inadequate. These statistics highlight ongoing issues surrounding menstrual poverty in government public schools in Zambia, particularly in rural schools, where detailed data is lacking.

Based on the forgoing, lack of menstrual pads by learners, leads to them missing school until their menses are done. If menses begin at school and they are not provided with pads and they end up soiling themselves, the shame from the taunting experience from the male students can have long-term consequences on the academic performance of the learner, ultimately leading to social and economic deprivation [20–22]. Despite the fact that studies on menstrual hygiene have been conducted in Zambia [10, 12, 23, 24], these studies have used qualitative data and have only concentrated on learners in rural areas with the view that those are the only ones that are affected by menstrual poverty, when, in practice, the problem is equally extant in urban areas. Therefore, this study will provide evidence on both the urban and rural experiences of learners with respect to menstrual poverty. Additionally, the use of a mixed-method sequential explanatory approach, incorporating perspectives from learners, school administration, and parents, distinguishes this research from previous studies. This comprehensive and nuanced approach will offer a deeper understanding of menstrual poverty among leaners in both rural and urban areas by understanding the knowledge, attitudes, and practices related to menstrual poverty among female learners in Kabwe district of Central Province in Zambia.

Methodology

Study design

The study was designed as a cross-sectional study using a mixed method sequential explanatory approach. This particular study design and approach were useful in obtaining information that systematically described the problem. Furthermore, the qualitative data complemented in filling gaps in the quantitative data and providing context on menstrual hygiene knowledge, attitudes and practices among learners in both rural and urban schools in Kabwe district of Zambia's central province.

Study setting

Data was gathered in rural and urban schools in Kabwe district of Zambia's central province. The district was chosen because, despite being the provincial capital, it has one of the lowest percentages of the population with access to safe and clean water and sanitation, and secondly, most learners in both rural and urban schools still find it difficult to obtain menstrual pads, despite the government providing them for free.

Study population

The study population consisted of female learners enrolled in public schools within the rural and urban

areas of Kabwe District, Zambia. Specifically, the sample was drawn exclusively from government basic and secondary schools during the first term of the 2023 academic year. This focus on government schools was motivated by a Zambian government ministerial statement by the minister of finance in 2019, where it was announced that government was going to start providing sanitary pads to all female learners in government schools, ensuring uninterrupted education during menstruation [25].

Sample size calculation

The sample calculation for this study was based on the following: $n = z^2 * [(p)\ (1\text{-}p)]/d^2$. Where: n is the required sample size; z is the z-score corresponding to the desired confidence level (1.960 for 95% confidence interval), p is the estimated prevalence of the outcome (0.5 in this case, assuming maximum variance), q = 1 - p, and d = 5% is the desired margin of error. Based on these values, the calculated sample size was 384 learners. To account for potential non-response, a 10% adjustment was applied, resulting in a total to 423 learners. Following data collection, a slightly larger sample of 447 learners was ultimately interviewed, with 221 from rural areas and 226 from urban areas.

Inclusion and exclusion criteria

Inclusion criteria

For learners to be included, they were required to be female learners actively enrolled in a public school within the study area at the time of the survey. To ensure a relevant sample, learners were included if they were aged 13 years or older and had initiated menstruation.

Exclusion criteria

To ensure a relevant sample, female learners who were not registered students at the time of the survey were excluded to maintain a focus on the current school population. To ensure a homogenous group, learners who had not yet experienced menstruation were excluded, as their experiences would differ significantly from those of menstruating participants. Furthermore, learners from private, community, and mission schools were excluded to limit the potential for confounding factors related to socioeconomic status and access to healthcare resources. These criteria were employed to focus on a population with a relatively consistent menstrual experience and exposure to school-based sanitary provision programme.

Sampling of learners who participated in quantitative data collection

Given the nature of the study, a multi-stage stratified random sampling technique was utilized. The schools were grouped into two strata based on the sampling frame provided from the District Education Board Secretary (DEBS) in Kabwe district, namely rural and urban schools, regardless of how long the school has been in existence. All of the schools in each of these strata were serially numbered, and simple random sampling was used to select four schools in each stratum (rural and urban). Once the schools selected, all female learners aged 13 and above were identified using class registers from each of those schools and systematically sampled with replacement. All the selected learners participated in the individual interviews. This approach was necessary as it ensured that each individual had an equal probability of being selected based on the inclusion criteria [26]. Moreover, this approach mitigated the biases that might have arisen from unequal representation of urban and rural learners, thereby enhancing the generalisability and reliability of the study's findings [27].

Sampling of learners and key informants who participated in qualitative data collection

We employed purposive sampling technique to select participants for the Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs). This approach was chosen to ensure that only respondents with specific expertise on the study's focus areas - knowledge, attitudes, and practices concerning menstrual poverty among learners in both urban and rural schools within Zambia's Kabwe-district were included.

In terms of KIIs, the District Education Standard Officer (DESO) was the primary informant at the DEBS office. At the school level, two head teachers (one rural and one urban), four female class teachers (two rural and two urban), and four female parents from the Parent-Teacher Association (two rural and two urban) were interviewed.

The head teachers provided insights into policy implementation and programme initiatives related to Menstrual Hygiene Management at the School level. The female class teachers offered detailed information on the actual activities implemented and their practice; given their direct interaction with learners during menstrual periods. The involvement of parents contributed to understanding community-level factors that may influence menstrual hygiene habits and behaviours, potentially perpetuating issues associated with, and related to menstrual poverty.

To identify contextual factors linked to menstrual poverty, four focus group discussions (two rural and two urban) were conducted with groups of 8–12 female learners. Only learners who had not participated in the one-on-one interviews were eligible to participate in the focus groups.

Data collection

All the data collection tools were developed based on a thorough review of existing literature, piloted to identify and address any ambiguities, and refined to ensure clarity and accuracy in capturing the intended data. The sampling of participants, data collection, and analysis was conducted in 2023. To accommodate learners with potential reading difficulties, structured questionnaires were administered to a randomly selected group of learners by the interviewers, and clarifications regarding the questions were provided at the time of data collection. The questionnaire included demographic, socio-economic questions, and menstrual poverty knowledge, attitudes, and practice questions. This comprehensive approach provided sufficient information to address the study objective.

Study variables

Outcome variable

The outcome variable of interest for this study was menstrual poverty. This primary outcome variable was operationalised as lack of access to menstrual hygiene products and facilities. Specifically, participants were questioned about their access to sanitary products such as pads, tampons, or reusable menstrual products. The frequency of access to these products through the schools' menstrual hygiene programmes and affordability were also investigated.

Explanatory variables

The primary independent variable for this study was the location of the school, categorized as either urban or rural. Additional variables considered included the age of the respondents, the biodemographic and socioeconomic characteristics of their guardians, and the respondents' knowledge, attitudes, and practices concerning menstrual poverty. Furthermore, traditional and cultural practices related to menstrual hygiene were also incorporated as independent variables.

Statistical analysis

The quantitative data gathered through questionnaires was entered into Epi-data and exported to Stata software version 14.2 (Stata Corp. In. Texas. USA) for cleaning and analysis. Descriptive and bivariate analyses were conducted. Descriptive statistics (means, medians, percentages, and frequency distributions) were calculated. Bivariate analyses, using Pearson chi-square tests at a 95% significance level, were performed to compare rural and urban schools.

Thematic analysis was used to analyse qualitative data acquired from KIIs and FGDs, which was done in the following stages. Thematic analysis was conducted using NVivo to identify patterns and themes in the qualitative data, employing a rigorous approach to ensure trustworthiness and accuracy. This comprehensive methodology comprised familiarization with the data, independent coding by two analysts, codebook development, theme identification through an iterative process, inter-coder reliability, peer debriefing, member checking, triangulation, and maintenance of an audit trail to document the analysis process, ultimately facilitating the trustworthy identification and interpretation of themes in the data, and providing a robust and in-depth understanding of menstrual poverty among female learners in rural and urban schools of Zambia. Finally, based on the study objectives, the quantitative data were supplemented by qualitative findings.

Ethical considerations

This study obtained informed consent and assent from all participants, ensuring maximum anonymity. Participation was voluntary, based on written consent from adults and assent from minors (< 18 year). All information and identities were kept confidential, and the data were used solely for research purposes.

The quantitative questionnaire was administered by trained interviewers. To safeguard confidentiality and accuracy, several measures were implemented. Personal identifiers were not collected, interviews were conducted in private settings, and interviewers were trained to maintain strict confidentiality and avoid bias.

Furthermore, the study adhered to the UN Universal Declaration of Human Rights. Ethical approval was granted by Mulungushi University School of Medicine and Health Sciences (MU-SoMHS) Research Ethics Board while the National Health Research Authority of Zambia (NHRA) granted permission to conduct research. Equally, the District Education Board Secretary (DEBS) for Kabwe district of central province sanctioned the study to be conducted in both rural and urban public schools.

Results

Demographic and socio-economic characteristics of learners and guardians to learners

Learners participating in the study

A total of 447 learners participated in the study, with a relatively equal distribution between urban 226 (51%) and rural 221(49%) schools (Table 1). The average age of participants was 16.0 plus or minus 1.58 standard deviation, slightly higher for urban learners 16.2 ± 1.46 compared to rural learners 15.8 ± 1.67. The majority of learners in both groups were 16 years old (64% and 53%, respectively). Regarding menarche age, average age at which the learners start their menstruation is 13.2 ± 1.37. Geographically, urban learners experienced their first menstruation slightly earlier at 13.1 ± 1.34 compared to rural learners at

Table 1 Percentage distribution of learners' and guardian's demographic and socio-economic characteristics by region of school

Variable	Urban (*N* = 226)		Rural (221)	
	Count	Percent	Count	Percent
Age Group				
15 years or less	81	35.8	104	47.1
16 years or more	145	64.2	117	52.9
Age started menstruating				
13 years or less	140	61.9	125	56.6
14 years or more	86	38.1	96	43.4
Learners grade				
9 or less	86	38.1	153	69.2
10 or higher	140	61.9	68	30.8
Employment status of guardian				
Yes	105	46.5	87	39.4
No	121	53.5	134	60.6
Highest educational level of guardian				
None	18	8	8	3.6
Primary	67	29.6	90	40.7
Secondary	119	52.7	99	44.8
Tertiary	22	9.7	24	10.9
Both biological parents alive				
Yes	157	69.5	168	76
No	69	30.5	53	24
Total	**226**	**100**	**221**	**100**
Current guardian to learners				
Mother or father	40	58	24	45.3
Sister or brother	9	13	12	22.6
Aunt or Uncle	9	13	10	18.9
Other family member	11	15.9	7	13.2
Total	**69**	**100**	**53**	**100**

13.3 ± 1.34. In terms of educational attainment sampled participants, a higher proportion of urban learners were enrolled in grade 10 or higher (62%), whereas the majority of rural learners were in grade 9 or lower (69%).

A comparative analysis of the guardians' employment status revealed that a lower percentage of guardians in rural schools (39%) were employed compared to their urban counterparts (47%). Moreover, a greater proportion of guardians in urban schools (62%) had attained secondary or tertiary education compared to those in rural schools (56%). The majority of learners in both urban (70%) and rural (76%) schools resided with their biological parents. Among the orphaned learners in both urban and rural settings, a significant number (58% and 45%, respectively) were living with their mother or father.

The data gathered from interviews revealed that parents who were formally employed were involved in activities such as peasant farming or selling items like groceries, second-hand clothes, vegetables, or fruits. The income generated from these endeavours typically ranged from Zambian Kwacha (ZMW) K600 to K2,000. For instance, one of the parents mentioned:

"I engage in selling second-hand clothes, and I manage to make around K8,000. However,after reinvesting in the business and covering various expenses,I usually end up with K600." (Parent: School 1, Urban School).

Even parents holding formal jobs, such as sanitary work and farm labour, earned low wages. For instance, a parent from School B shared,

> *I work as a toilet cleaner and earn K1, 000 per month.*

Table 2 Percentage distribution of learner's knowledge and source of information of information on menstruation

Variable	Urban (*N* = 226)		Rural (221)		*p*-value
	Count	Percent	Count	Percent	
Correctly define menstruation					*0.461*
Yes	166	73.5	169	50.4	
No	60	26.5	52	46.4	
First heard about menstruation					*0.081*
Mother-sister-grand-mother	96	42.5	108	48.9	
Other family member (aunt-cousin)	9	4.0	17	7.7	
School (Teachers-Pupils)	55	24.3	38	17.2	
Other (Friends & NGOs)	66	29.2	58	26.2	
Menstruation is a normal occurrence					*0.150*
Yes	220	97.3	219	99.1	
No	6	2.7	2	0.9	
Total	**226**	**100**	**221**	**100**	

*Statistically significant at p-value < 0.05

Knowledge of menstruation and access to menstrual products among learners

Knowledge and source of information among learners

Out of the 447 learners interviewed, all of them reported knowing what menstruation is (100%). However, when they were asked to defined menstruation, Table 2 reveals that more learners from urban schools compared to rural were able to correctly define menstruation (74% versus 50%) respectively. Majority of the learners in both urban and rural schools reported that their mothers, sisters and grandmothers were the first people they heard from about menstruation (43% and 49%), followed by friends and NGOs (29% and 26.2%), and schools (24% and 17%) respectively. Further, findings from this study indicates that learners in both urban and rural schools think that menstruation is a normal occurrence to any girl who come of age (97% and 99%) respectively.

The data collected from interviews with learners revealed that a significant number of them, particularly those attending rural schools, initially learned about menstruation from their grandmothers, as opposed to other groups. For instance:

"I learned about menstruation from my grandmother. She told me that when you reach puberty,you will start experiencing a monthly flow of blood." (Learner 1: School A).

Conversely, learners from urban areas acquired their knowledge from a variety of sources, with both mothers and grandmothers playing significant roles. The following excerpts illustrate this:

"In my case,it was my mother who informed me. She explained that as a girl grows up,she will begin to have periods. When I actually started,she provided me with pads and instructed me on maintaining hygiene." (Learner 8: School B).

Table 3 Percentage distribution of learner's access, providers and alternatives to menstrual pads by region of school

Variable	Urban		Rural		*p*-value
	Count	Percent	Count	Percent	
Access menstrual pads from school					***0.002****
Yes	65	28.8	37	16.7	
No	161	71.2	184	83.3	
Total	**226**	**100**	**221**	**100**	
Number of times received pads per term					*0.321*
Once per term	49	75.4	31	83.3	
Twice or more	16	24.5	6	16.2	
Pads adequate for use during the term					*0.052*
Yes	31	47.7	25	67.6	
No	34	52.3	12	32.4	
Total	**65**	**100**	**37**	**100**	
If not adequate who helps you out					*0.581*
Parents or guardian	28	82.4	9	75.0	
Others (Sister, aunt)	6	17.6	3	25.0	
Total	**34**	**100**	**12**	**100**	
Buys pads for learners if not accessing from school					*0.554*
Parent or guardian	108	65.8	111	60.3	
Aunt or sister	17	11.2	30	16.3	
No one (use cloth)	38	18.6	34	18.5	
Other (family member & NGOs)	58	4.3	9	4.9	
Total	**161**	**100**	**184**	**100**	
Learner found in a situation with no means to access menstrual pads					*0.802*
Yes	166	99.1	160	97.3	
No	60	0.9	61	2.7	
Used instead if no means to access to menstrual pads					0.220
Piece of cloth from a wrapper (chitenge) old cloth	142	85.5	144	90.0	
Cotton wool-diapers-tissue	24	14.5	16	10.0	
Total	**166**	**100**	**160**	**100**	

*Statistically significant at p-value < 0.05

Access of menstrual products by learners from schools

Table 3 below shows that, altogether, barely one-third (102) of the learners reported receiving menstruation pads within the term at their schools. A statistically significant association was found between region of school and learners' access to menstrual pads. In comparison to learners in rural schools (17%), twice as many learners in urban schools (29%) reported receiving menstrual supplies $p = 0.002$. Further, an independent-samples t-test was conducted to compare the number of times learners from rural and urban schools received menstrual pads per quarter. There was no significant difference in scores for learners from rural schools (M = 1.22, SD = 0.53) and urban schools (M = 1.48, SD = 0.92; t (100) = -1.58, $p = 0.12$, two-tailed). The magnitude of the differences in the means (mean difference = -0.26, 95% CI: – 0.59 to 0.07) was very small (eta squared = 0.024). In addition, 25% of the learners in urban schools receive menstruation pads twice a month or more, compared to 16% of the learners in rural schools.

Results in Table 3 further indicates that of the total 102 learners who indicated who indicated that they have accessed menstrual pads from school, more learners from rural schools (67%) than urban schools (48%) indicated that they are adequate, though this difference was not statistically significant ($p = 0.052$). Among the learners who indicated that the pads they access from school are were not adequate, 82% of the learners in urban schools revealed that the parents or guardian provide for them compared to 75% in rural areas. Similarly, for learners who do not access pads from school, majority of them in both urban and rural schools indicated that their parents of guardian buy for them (66% verses 60%), respectively. In addition, 99% and 97% of the learners in both urban and rural schools indicated that at some point they have found themselves in situations where they had no means in accessing menstrual pads though not statistically significant ($p = 0.802$).

In addition, at least six out of ten learners in both urban and rural schools (60% vs. 66%) reported receiving pads from their parent or guardian of the 345 learners who said they don't receive them from their schools. Further,

in both rural and urban schools, roughly two out of every ten learners said that no one offered them assistance. Moreover, 86% and 90% of the learners in both urban and rural schools resorted to using a piece of cloth from a wrapper (Chitenge) or old cloth, whereas other ended up using cotton wool, tissue or diapers.

The qualitative data obtained from interviews with both parents and learners aligned with the quantitative findings, indicating that learners often did not receive an adequate supply of sanitary pads, if they received any at all. The quotes below exemplify this sentiment:

"No,the school does not provide pads." (Parent: School A).

"They teach the girls about menstrual health and provide pads,but there are not enough for everyone." (Parent: School B).

Insights from discussions with teachers and school authorities revealed that support for menstrual hygiene came from two sources: the government and Non-Governmental Organizations (NGOs). The government allocated funds for the procurement of menstrual products, but schools occasionally diverted these funds to other pressing needs. Consequently, schools sometimes failed to supply pads to learners or only distributed them to those in urgent situations. The government's support was also considered insufficient due to the growing school population:

"The government sends money to buy pads,but sometimes the school uses the money for other needs due to competing interests. In emergencies,learners can get pads,but usually not a full pack." (Teacher: School D).

NGOs like DREAMS and CAMFED also played a role in supporting learners through education and distribution of menstrual supplies. These organizations target the most vulnerable girls in the school:

"Support comes from CAMFED. They provide pads to the girls they support,specifically the most vulnerable. Those not under CAMFED receive support from the government." (Teacher: School D).

However, some learners expressed concerns about the fairness of pad distribution and the lack of accountability. In a focus group discussion with learners from school D:

"Teachers should be fair when giving pads; they only give them to people they know. Some pads remain in the office." (Learner 1).

"I signed for receiving pads from CAMFED,but I have never actually received anything." (Learner 2).

"I received pads in grade 9." (Learner 3).

Information gathered from interviews with parents, teachers, and learners themselves highlighted the difficulties faced by learners who resorted to using pieces of cloth as makeshift sanitary products. These challenges encompassed issues such as leakage, unpleasant odors, and the development of blisters and sores on their thighs. Due to the fear of staining their uniforms, some learners even expressed a preference for skipping school altogether. One learner conveyed their experience:

"I dislike using a cloth because it causes sores and I am always worried that it might leak. As a result,I find it better to avoid school altogether." (Learner 2: School E).

Attitudes, practices and taboos associated with menstruation among learners

Results in Table 4 below indicates that among learners from both urban and rural schools, 73% felt sad, worried or uncomfortable the first time they started menstruating whereas, fewer learners in urban and rural schools felt happy about it (20% verses 22%) respectively. Almost 90% of the learners in both urban and rural schools indicated that they talked to someone first time they had their periods. A statistically significant difference was observed in the association between learner's region of school and the person they talked to first time they had menses. Among urban learners, majority of them talked to their mothers (60%) followed by family member (33%), whereas for rural learners, most of them talked to their family member (47%) and their mothers ($p = 0.006$).

Interviews with learners indicated that most of them were afraid when they first saw their period with some suspecting that there was something wrong with their bodies, as indicated in the quotation below:

"I was scared that maybe I was sick of bilharzia." (Learner 4: School D).

For me I started looking for a sore because I was wondering where the blood came from that's when my grandfather called our neighbours to come help me and teach me. (Learner 4 1: School D).

Some expressed happiness at the sight of their first period stressing that they were now women.

"I was told about periods by my friends that it is a good sign that you are now a woman. So,when I saw blood,I was happy that I was a real woman." (Learner 4: School E).

There were also a few said that they were shy to talk about their experience:

"When I started my periods,I felt shy to tell my mother." (Learner 1: School B).

Data from one of the focus groups discussed revealed that some learners spoke to a family members when they saw their first period with the mother, grandmother and sibling being the most talked to individuals. The people they spoke to also gave them instructions on what they needed to do as stated by the two learners:

"For me it was my mother,she told me that when a girl grows,she will start her periods and when I started,she gave me pads and told me to bath." (Learner 8: School B).

"I told my sister and she told my mother and she taught me about pads and told me to bath early in the morning." (Learner 3: School B).

Table 4 Percentage distribution of learner's attitudes, practices and taboos towards menstruation by region of school

Variable	Urban		Rural		*p*-value
	Count	Percent	Count	Percent	
Felt first time started menstruating					*0.587*
Happy	46	20.4	49	22.2	
Sad/worried/uncomfortable	165	73.0	162	73.3	
Others	15	5.6	10	4.5	
Talked to someone					*0.701*
Yes	202	89.4	195	88.2	
No	24	11.2	26	11.8	
Total	**226**	**100**	**221**	**100**	
Person talked					***0.006***
Mother	122	60.4	87	44.6	
Family member	66	32.7	92	47.2	
Friend or community member	14	6.9	16	8.2	
Said to learner					*0.231*
Being hygienic	64	31.7	63	32.3	
Never play with boys	34	16.8	38	19.5	
Never do household chores	10	5.0	18	9.2	
It's just a normal process to getting of age	94	46.5	76	39.0	
Did to learner					***0.007***
Given herbs to drink, apply or bath	43	21.3	59	30.3	
Isolated in a room until periods were done	21	10.4	25	12.8	
Give pain killers	14	6.9	8	4.1	
Shown how to care of myself	29	14.4	42	21.5	
Never touch pots or eat, touch salt	95	47.0	61	31.3	
Total	**161**	**100**	**184**	**100**	
Aware of taboos					*0.67*
Yes	146	64.6	147	66.5	
No	80	35.4	74	33.5	
Total	**226**	**100**	**221**	**100**	
Taboos associated with menstruation					*0.095*
Avoid being found or sleeping with boys	18	12.3	28	19.0	
Never throw used pads anyhow	8	5.5	2	1.4	
Never touch baby/brazier/fire for cooking	9	6.2	11	7.5	
Never cook food or touch pots	33	22.6	23	15.6	
Never touch salt/sugar or put in food	78	53.4	83	56.5	
Learners' thoughts about taboos					*0.192*
They are helpful teachings (keep us and others safe)	47	32.2	57	38.8	
Must be followed (bad things happen if not followed)	27	18.5	33	22.4	
They are fake/lies/weird imaginations	72	49.3	57	38.8	
Total	**146**	**100**	**147**	**100**	

*Statistically significant at p-value < 0.05

Learners where further asked on what they were told by the persons they had talked to first time they had menses. Results in Table 4 indicate that among both urban and rural learners, majority were informed that its menstruation was just a normal process of coming of age for a girl child (47% verses 39%), they needed to be hygienic (32%) and that they should never play with boys (17% verses 20%) respectively. Further, when learners were asked about what the people, they had spoken did to them or were told to do, a statistically significant differences were observed between urban and rural learners. Majority of the learners in both urban and rural schools were told not to touch pots or eat food with salt or touch salt (47% verse 31%), given herbs to drink, apply or bath (21% verse 30%), and shown on how they should take care of themselves (14% verse 22%) with p-value = 0.007.

Interviews with learners revealed that a number of them in both rural and urban schools were subjected to some rituals, corresponding with the quantitative findings as follows:

"When I started (my periods),I told my grandmother and she gave me medicine to drink and bath with and

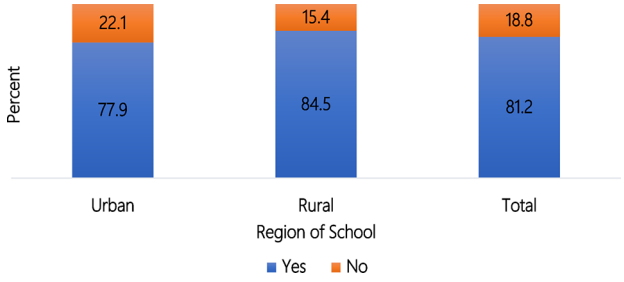

Fig. 1 Percentage distribution of learners reporting having sanitary facilities by region or school

told me not to eat salty food and that I should not go near boys." (Learner 4: School B).

"When my grandmother came back,I was given food without salt and I did not cook for one week,she put me in an isolated room and then gave me black things to chew." (Learner 1: School D).

"I wore a white dress and it was stained my mother got it and gave me weird things to eat with a lot of salt… they looked like coconut,and when I took it,I threw it on the roof." (Learner 6: School D).

Additionally, learners were asked if they were aware of some customs and taboos associated with menstruation. Results in Table 4 indicate that 65% and 67%of the learners in urban and rural schools were aware of some taboos associated with menstruation. Some of the taboos highlighted included never to touch salt/sugar or put salt/sugar in the food (53% verses 57%), never to cook food or touch pots (23% verses 16%) and avoid been found or sleeping with men (12% verses 19%) respectively. Similarly, when learners were asked about their thoughts on the said taboos, more learners in urban than rural schools feel that taboos are simply fake/lies/weird imaginations (49% verses 39%), taboos are helpful as they help to keep learners and others safe (32% verses 39%), and that if these taboos are not followed bad things may happen (19% verses 22%).

Interviews with learners, teachers and parents revealed a mix of feelings when it came to whether the taboos were right or wrong in both rural and urban schools. For example, some learners in one urban school (school C) did not believe in the taboos while others did.

"I also do not believe." (Learner 7).

"For me when I put salt in the food and I observed that the children get a cough." (Learner 1).

"I do believe because when I touched the baby when I was menstruating the baby got a rash." (Learner 5).

Notably even one of the teachers in a rural school also said they believed in the taboos as stated in the excerpt below:

"Yes,I do practise them (taboos) because I have witnessed where this happens (being bewitched through a used pad,a child getting a cough because it was nursed by a menstruating person)." (Teacher: School D).

Availability, adequacy, and appropriateness of sanitary and toilet facilities

Figure 1 below shows that overall. eight out of every ten learners indicated that their school has sanitary facilities, compared to about two out of ten who indicated on the contrary, albeit this difference was not statistically significant ($p = 0.068$). When the data were broken down by location of the school, more learners in rural schools (85%) than in urban schools (78%) stated that their schools had sanitary facilities.

Overall, Table 5 shows that more than one third (70%) of the learners use flush toilets as sanitary facilities, followed by Bins (19%) and Latrines (16%). Split by region of school, as expected, more learners in urban schools (73% and 37%) used flush toilets and Bins as sanitary facilities whilst at school compared to (67% and 4%) among learners from rural schools. On the other hand, more learners in rural schools than in urban schools use latrines as sanitary facilities (30% vs. 1%) respectively. Further, learners were asked the type of toilet facilities that they were using

Table 5 Percentage distribution of pupil's type of sanitary and toilet facilities used by region of school

Variable	Rural		Urban		Total	
	Count	Percent	Count	Percent	Count	Percent
Type of sanitary facility at school						
Flush toilets	123	66.5	128	73.1	251	69.8
Incinerator	0	0.0	2	1.1	2	0.6
Bins	1	0.5	64	36.6	65	18.6
Rubbish Pits	8	4.3	14	8.0	22	6.2
Latrine	56	30.3	2	1.1	58	15.7
Type toilet use at school						
Pit latrine	131	59.3	10	4.4	141	31.9
Flush toilets	116	52.5	215	95.1	331	73.8
VIP toilet	8	3.6	2	0.9	10	2.3
Pit latrine with slab	0	0.0	2	0.9	2	0.5
Bush	0	0.0	2	0.9	2	0.5

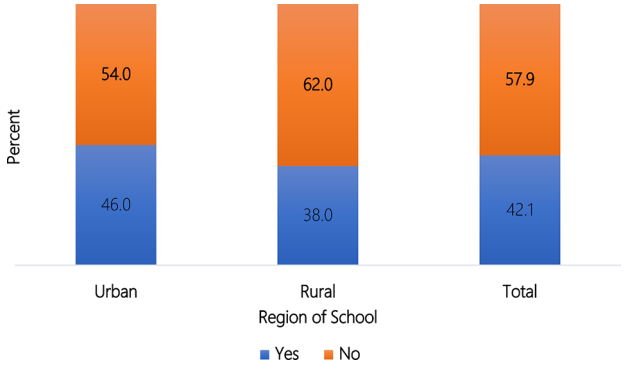

Fig. 2 Percentage distribution of learners reporting being comfortable with the toilet facilities in school during menstruation by region or school

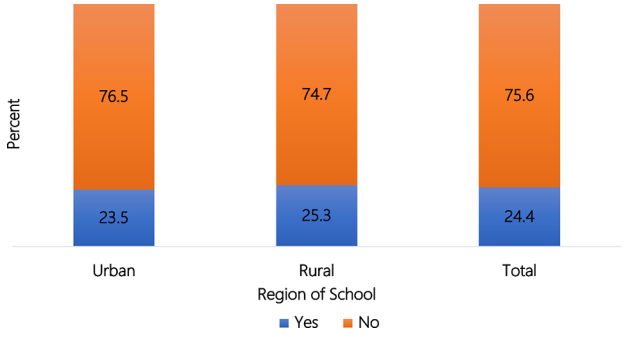

Fig. 3 Percentage distribution of learners reporting they missed school because of the state of the facilities at school during menstruation by region or school

at school, less than three quarters (74%) reported using Flush toilets, followed by latrines 32%. Similarly, more learners in urban schools than in rural schools reported using flush toilets at school (95% vs. 53%) whereas on the contrary, majority of the learners in rural schools use Pit latrine toilets (60%) compared to learners from urban schools (4%).

The study's findings in Fig. 2 also show that just four out of ten learners responded positively when asked if using the restroom at school while menstruating was comfortable. When learners were compared by region of school, more learners in urban schools (46%) than in rural schools (38%) reported feeling at ease, albeit this difference was not statistically significant ($p = 0.086$).

Table 6 reveals that the major reasons cited for not being comfortable using the toilet facilities by the learners when menstruating from both the rural and urban schools include toilet facilities being dirty (50%), lack of privacy (24%), and no water (14%) (*see Table*). Nonetheless, more learners in rural schools (57%) than urban schools (43%) cited toilets being dirty as the main reason for them not being comfortable, and no water as a reason for not being comfortable was almost twice as high among learners in urban schools (18%) than those in rural schools (10%).

Data obtained from interviews with all respondents including parents, learners, teachers and administrators revealed that the sanitary facilities in schools were generally inadequate as schools had excessive number of learners. However, while teachers and school administrators held the general view that the toilets were clean, parents and learners stated the contrary. Parents and learners complained that the toilets and other sanitary facilities were generally dirty and as such, most learners were uncomfortable using them. In this regard, some resorted to using the nearby bush while others waited to get home to use their home facilities.

The toilets available are not enough for the children so they are usually dirty. (Parent: School A).

According to Fig. 3 below, there is no statistically significant difference between the percentage of learners who report missing school when menstruating due to the condition of the toilet facilities in rural or urban schools (25% vs. 24%, $p = 0.642$). A follow-up question was also posed to learners who admitted missing class, asking how many days per week they had missed while being home due to their period. An independent-samples t-test was conducted to compare the number of days learners from rural and urban schools were absent from school. There was no significant difference in scores for learners from rural schools ($M = 2.43$, $SD = 1.16$) and urban schools ($M = 2.36$, $SD = 0.94$; $t\ (107) = 0.35$, $p = 0.73$, two-tailed). The magnitude of the differences in the means (mean difference = 0.70, 95% CI: −0.33 to 0.47) was very small (eta squared = 0.001).

Table 6 Percentage distribution of pupil's main reason for being uncomfortable with using toilet facilities during menstruation by region of school

Variable	Rural		Urban		Total	
	Count	Percent	Count	Percent	Count	Percent
Reason for not using the toilets						
They are dirty	77	56.6	52	42.6	129	49.6
Usually, no water	13	9.6	22	18.0	35	13.8
They smell bad	9	6.6	11	9.0	20	7.8
No privacy	33	24.3	29	23.8	62	24.1
Uncomfortable or safe	8	5.9	16	13.1	24	9.5
No shower or bin	6	4.4	2	1.6	8	3.0

Data obtained from interviews with parents, teachers, school administrators including learners themselves indicated that some learners missed school due to menstrual related matters. It was indicated that most of them missed an average of 2 days in a month due to menstrual related matters. The most frequently cited reason for missing school was learners experiencing abdominal pains and a lack of pads. In addition, a few learners said that they missed lessons because they were afraid to soil their uniform and be laughed at by boys.

"When I do not have pads and use cloth,I choose to miss school because the cloth leaks and when your skirt is stained with blood,boys laugh at you. It is embarrassing." (Learner 4: School E).

A few also noted that they missed school because of lacking of proper sanitary facilities:

"There are days when my period is heavy,I ask my mother to miss school because the toilets are dirty and I cannot change the pad properly." (Learner 4: School E).

Discussion

This study sought to conduct a comparative analysis of the factors associated with menstrual poverty among female learners in rural and urban schools in Zambia. The underlying assumption is that poor menstrual conditions can contribute to absenteeism, leading to suboptimal academic performance and progression rates, particularly among vulnerable learners. More importantly, these conditions can pose significant health risks to the female learners' reproductive health, including increased susceptibility to infections like uterine tract infections and bacterial vaginosis. In severe cases, such conditions may even lead to infertility or complications during childbirth in future.

According to our study, learners in both urban and rural schools begin experiencing monthly periods as soon as they become teens. This aligns with previous studies by [28, 29], which reported the onset of menstruation at age 13. Contrarily, a study [30] on the attitudes and experiences of menstruation among teenage learners enrolled in school, revealed that the participants in the study began menstruating somewhat earlier, at age 12. While the exact reasons for these variations in the ages at which learners start menstruating remain unclear, potential factors include bio-demographic and socioeconomic differences, such as nutritional status, body weight, race, ethnicity, heredity, and sedentary lifestyles [31].

Our findings show that learners in both rural and urban areas understand the concept of menstruation. Further, the results that more learners in urban than rural schools were able to define menstruation accurately, are encouraging and offer a chance to challenge prevailing cultural and traditional notions about the menstrual cycle. A comprehensive understanding of menstruation is cardinal for preparing adolescents for menarche. A lack of such knowledge can lead to learners succumbing to myths, taboos, misconceptions, stigma and discrimination. Additionally, it may hinder normal childhood growth and development, as well as their ability to participate in activities associated with menstruation at an appropriate age. Similarly, studies conducted by other researchers have revealed that in certain contexts, not all girls possess a complete understanding of menstruation [32]. Similarly [33], observed a lower prevalence of full menstrual knowledge among adolescent girls in their study conducted in India, with only 65% demonstrating a comprehensive understanding. The observed discrepancy in menstrual knowledge can be attributed to various factors, including study environments. School-based studies, such as the present one, may provide girls with greater access to accurate information and education about menstruation, even though there is a mix of sources of information as observed in this study. Conversely, community-based studies often rely on family members, such as mothers, grandmothers, aunts, and, sisters, as primary source of information. These individuals may lack the necessary knowledge to provide girls with an adequate education, potentially leading to misinformation. Furthermore, even school-based lessons on menstruation may be overshadowed by prevailing social-cultural norms, beliefs, and taboos within their community.

The results of this study show that contrary to expectations, only about two out of ten learners in both rural and urban schools reported learning about menstruation from their teachers for the first time. Conversely, four in ten learners got this knowledge from their mothers, and three in ten from their peers. This outcome is somewhat surprising given the widespread expectation that schools should serve as the primary source of accurate and comprehensive menstrual health education. The forgoing estimates match those of [32] in their study conducted in Nigeria, where they observed that teachers accounted for 30% of this information, mothers for 42%, and friends for 32%. This disparity can be attributed, in part, to the significance placed on social-cultural teachings in certain contexts. If cultural and traditional teachings are highly valued, learners maybe more inclined to follow established societal practices. In a similar vein, the qualitative study revealed that some teachers do subscribe to the taboos surrounding menstruation. This suggests that even with advanced education, educators may not always be willing to change cultural teachings and impart alternative perspectives to their learners. Having said that, the first-hand knowledge learners receive could be crucial, depending on whether their menstruation begins at home or at school. Therefore, it's also likely that the majority of learners began their menstruation at home, in

which case the issue of when their first period began was not addressed.

Our study found that seven in ten girls in both rural and urban schools, experienced negative emotions surrounding their first menstrual period. This aligns with previous research by [32, 34] which found that among school-going girls in Nigeria and India they felt embarrassed, ashamed, stigmatised and experienced low self-esteem resulting from menstruation. Despite the learners in our study having access to mass media, knowledgeable teachers and a school curriculum comprising information on menstruation, it is concerning that such negative feelings towards menstrual periods persist. This is because such attitudes and behaviours may have long lasting social, psychological and mental effects on the learners, post-menarche. For example, studies reveal that issues of self-discrimination, shame, depression, mental health and lack of self-esteem can be among the major health-related problems these learners may suffer from in the long-run, especially in environments or communities where social rigidity is rife and cultural and traditional teachings are widely adhered to. Moreover, the fact that the focus of most mothers, teachers and friends' messages to learners immediately they start their menses is hygiene, the erstwhile mentioned health problems may not be adequately addressed. Additionally, the pain associated with menstruation can also lead to some learners missing classes, potentially impacting their academic performance [3].

Studies by [28, 35] previously reported that girls tended to use a cloth as a menstrual alternative to sanitary pads. Our findings corroborate these observations, revealing that learners in both rural and urban schools frequently employ unconventional products such as cloth, diapers, and cotton wool during menstruation. These practices have been linked to various reproductive health complications, including fungal infections, urinary tract infections, bacterial vaginosis, toxic shock syndrome, thrush, pelvic inflammatory disease, and cervical cancer [5,7,10,]. The prevalence of such practices suggests that access to menstrual pads remains a challenge for learners in both rural and urban schools. For example, learners' household socio-economic conditions such as parents or guardians with low educational attainment and income, could be some of the main barriers to ensuring that the learners have consistent and correct supply of menstrual products [36–38]. Consequently, both rural and urban schools should prioritise education on proper menstrual practices. Neglecting this crucial aspect may increase the risk of learners experiencing reproductive health problems.

In view of the forgoing, the Zambian government initiated a programme in 2015 to distribute sanitary pads in both rural and urban public schools. Nonetheless, since the inception of this programme, only about three and two out of every ten urban and rural learners, respectively, reported accessing menstrual pads from their schools. Besides, although not statistically significant, a greater portion of rural learners than urban learners (67% compared to 48%) indicated that the sanitary pads that they received were sufficient. The observed differences in the prevalence maybe attributed to the fact that most rural learners rarely have access to these pads and often rely on unconventional sanitary products. Consequently, receiving pads, even if insufficient, may be perceived as sufficient.

Conversely, for those who indicated that the provided pads were insufficient, parental or guardian support was often sought to bridge the gap. Nonetheless, even this parental or guardian support could prove inadequate. Consequently, nearly all interviewed learners reported that at some point they experienced a shortage of menstrual products when they were menstruating, despite government and family support. Therefore, the absence or limited accessibility of menstrual products can lead to absenteeism among female learners due to the shame associated with soiling themselves during menstruation. Moreover, a lack of a comprehensive and high-quality education on menstruation can further diminish female learners' chances of graduating and securing employment. Consequently, this can perpetuate a cycle of poverty, regardless of whether the learners attend rural or urban school [39].

Previous research has documented several taboos associated with menstruation, including the belief that women are unclean during their menstrual cycle and should consequently avoid cooking, touching plates, or participating in religious activities [40, 41]. In addition, some females are even forbidden from washing their genitalia after menstruation due to concerns about water contamination in shared bathrooms [42]. In line with the aforementioned, our study found that there was a statistically significant association between learners in rural and urban areas with regard to taboos and practices associated with menstruation. Practices ranged from restrictions on touching pots (31% verses 47%) and the use of herbal remedies for drinking, application or bathing (30% verses 21%). The prevalence of such beliefs and practices is influenced by their cultural embeddedness. Contrary to our expectations, given the study's focus on learners, we observed that both rural and urban schools' learners engage in certain practices that may hinder efforts to address negative attitudes, practices and behaviours surrounding menstruation. Though this is the case, current evidence indicates a growing movement among women and girls to challenge these taboos, as most often, they are instrumetalised to create systemic and structurally rooted inequalities in some societies, preventing young

girls from recognising menstruation as a normal biological process [43].

Schools must provide adequate sanitary facilities such as, toilets, pit latrines, and hand-washing facilities for female students to manage their menstrual cycles effectively [44]. The absence of inadequacy of such facilities can lead to increased absenteeism and poses, significant risk due to the potential for bacteria growth and infection. In spite of the fact that learners in both urban and rural schools reported having adequate sanitary facilities, only four out of every ten learners (38% rural and 46% in urban) said they were comfortable with them in this study. This implies that a large number of learners were uncomfortable due to the unhygienic surroundings, lack of seclusion, and water in the facilities. The results of our research show that learners in rural schools may even be more at risk of skipping lessons and contracting illnesses due to the poor state of sanitary facilities. While the statistical significance of this difference is inconclusive, it highlights the urgent need for improvement in these areas. For instance, while [45] found that all learners were not satisfied with the handwashing and sanitary facilities in both rural and urban schools in Western Maharashtra, India, only 25% of the learners reported missing class. In contrast, a study conducted in 2015 by Sivakamir et al. in government schools across three states in India, discovered that just 1 in 10 students missed class because of a lack of sanitary facilities.

Study limitations

The major strength of the study lies in the approach, by using used a mixed methods explanatory sequential design that included learners in both rural and urban schools provide a much broader understanding of the school environment and contextual factors contributing to menstrual poverty in public schools in Zambia. Moreover, through a qualitative methodology, the research provided a nuanced understanding of the emotional, social, and academic impacts of this issue by prioritizing a learner-centred perspective, ensuring that the voices and experiences of female learners were at the forefront of the research. In contrast, the study had its own limitations. Specifically, the study did not look at the inventory of pads received and the number of menstruating learners to determine whether the shortage in supply of sanitary pads is at source, and as such there is nothing the school management can do to ensure the supply is adequate. Equally, the exclusion of male learners from this study limits the full understanding of whether they play a role in making female learners uncomfortable when they are menstruating.

Conclusion

Menstrual hygiene remains a significant issue of reproductive health among female learners in rural and urban public schools in Zambia. While menstrual knowledge is generally understood among female learners, significant disparities exist in its sources and depth. Although schools play a role, mothers and peers remain primary sources of information, potentially influenced by cultural norms and misconceptions in both rural and urban schools. Despite access to menstrual health education, negative emotions surrounding menarche persist, highlighting a need for more comprehensive psycho-social support to ensure schools remain a safe and inclusive space for learners who are menstruating. Furthermore, access to sanitary products remains a significant challenge, with cloth and other unconventional methods frequently used. Although the government provides resources for purchasing pads for learners in public schools, distribution and sufficiency remain issues. This, coupled with inadequate and unhygienic sanitary facilities, contributes to absenteeism and potential reproductive health risks. Besides, persistence of cultural taboos surrounding menstruation, impacts learners' experiences and potentially hinders their academic progress. Addressing these challenges requires enhanced national policies and programmes focused on improving menstrual health education, increased access to affordable and sustainable menstrual products, and the provision of clean and safe sanitary facilities within public schools.

Abbreviations

CAMFED	Campaign for Female Education
CSO	Civil Society Organisation
DEBS	District Education Board Secretary
DESO	District Education Standards Officer
DREAMS	Determined, Resilient, Empowered, AIDS-free, Mentored and Safe
FGDs	Focus Group Discussions
KIIs	Key Informant Interviews
LMICs	Low- and Middle-Income Countries
M	Mean
MHM	Menstrual Hygiene Management
MoE	Ministry of Education
MU-SoMHS	Mulungushi University, School of Medicine and Health Sciences
NGOs	Non-Governmental Organisation
SD	Standard Deviation
SDGs	Sustainable Development Goals
SSA	Sub-Sahara Africa
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund

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Author contributions
BBB conceptualised the study, developed the tools, analysed the data and drafted the manuscript; AM wrote the introduction and discussion of the manuscript, PA wrote the discussion of the manuscript, CN conceptualised, coordinated the data collection and wrote the introduction; and CMK coordinated the qualitative data analysis and proof read the manuscript.

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The study was funded by Mulungushi University Research Fund. Nonetheless, it should be noted that the University had no roles in the design and full implementation of this study including the write up of this manuscript.

Data availability
The data utilized in this research are accessible from the corresponding author upon justifiable inquiry.

Declarations

Ethics approval and consent to participate
Before the full implementation of the study, the study protocol was reviewed by Mulungushi University School of Medicine and Health Sciences Research Ethics Board under the following numbers (1RB: 00012281; FWA: 0002888). Informed consent was obtained from all subjects and/or their legal guardian(s). Equally, informed consent was taken from legally authorized representative and/or guardians of all minor participants.

Consent for publication
Study participants were verbally informed and consent gotten for the publication of the findings.

Competing interests
The authors declare no competing interests.

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References

1. UNICEF. Menstrual hygiene | UNICEF. (2018). https://www.unicef.org/wash/menstrual-hygiene
2. International Institute for Sustainable Development. Generation 2030: The Cost of a Period: The SDGs and Period Poverty | SDG Knowledge Hub | IISD. (2022). https://sdg.iisd.org:443/commentary/generation-2030/the-cost-of-a-period-the-sdgs-and-period-poverty/
3. Sivakami M, van Eijk AM, Thakur H, Kakade N, Patil C, Shinde S, Surani N, Bauman A, Zulaika G, Kabir Y, Dobhal A. Effect of menstruation on girls and their schooling, and facilitators of menstrual hygiene management in schools: surveys in government schools in three states in India, 2015. J Global Health. 2019;9(1). https://doi.org/10.7189/jogh.09.010408.
4. UNESCO. Puberty education and menstrual hygiene management. (2014). https://unesdoc.unesco.org/ark:/48223/pf0000226792
5. Rohatgi A, Dash S. Period poverty and mental health of menstruators during COVID-19 pandemic: lessons and implications for the future. Front global women's health. 2023;4(1128169). https://doi.org/10.3389/fgwh.2023.1128169.
6. Sanusi T. 4 Ways Period Poverty Affects Africa's Women and Girls, According to Activists. Global Citizen. (2022, July 4). https://www.globalcitizen.org/en/content/period-poverty-activists-africa-impact-women-girls/
7. World Bank. Menstrual Health and Hygiene [Text/HTML]. World Bank. (2022). https://www.worldbank.org/en/topic/water/brief/menstrual-health-and-hygiene
8. United Nations Department for Economic and Social Affairs. Population 2030 Demographic challenges and opportunities for sustainable development planning ((ST/ESA/SER.A/389)). (2015). https://www.un.org/en/development/desa/population/publications/pdf/trends/Population2030.pdf
9. Shah V, Nabwera H, Sonko B, Bajo F, Faal F, Saidykhan M, Jallow Y, Keita O, Schmidt WP, Torondel B. Effects of menstrual health and hygiene on school absenteeism and drop-out among adolescent girls in rural Gambia. Int J Environ Res Public Health. 2022;19(6):3337. https://doi.org/10.3390/ijerph19063337.
10. Chinyama J, Chipungu J, Rudd C, Mwale M, Verstraete L, Sikamo C, Mutale W, Chilengi R, Sharma A. Menstrual hygiene management in rural schools of Zambia: a descriptive study of knowledge, experiences and challenges faced by schoolgirls. BMC Public Health. 2019;19:1–0. https://doi.org/10.1186/s12889-018-6360-2.
11. Person C, Kyula NC, Opong E. Investigating the perceptions and barriers to Menstrual Hygiene Management (MHM) in Zambia. World Vis Int. 2014.https://www.wvi.org/sites/default/files/Final%20MHM%20Report_CPerson_2.14.2014_0.pdf
12. UNICEF. Advancing Girls' Education through WASH in Schools: A Formative Study on Menstrual Hygiene Management in Mumbwa and Rufunsa Districts, Zambia. (2017). (pp. 1–44). https://www.unicef.org/zambia/media/826/file/Zambia-menstrual-hygiene-management-schools-report.pdf
13. Habtegiorgis Y, Sisay T, Kloos H, Malede A, Yalew M, Arefaynie M, Damtie Y, Kefale B, Tegegne TB, Addisu E, Lingerew M. Menstrual hygiene practices among high school girls in urban areas in Northeastern Ethiopia: a neglected issue in water, sanitation, and hygiene research. PLoS ONE. 2021;16(6):e0248825. https://doi.org/10.1371/journal.pone.0248825.
14. Tegegne TK, Sisay MM. Menstrual hygiene management and school absenteeism among female adolescent students in Northeast Ethiopia. BMC Public Health. 2014;14:1–4. https://doi.org/10.1186/1471-2458-14-1118.
15. Khamisa N, Nanji N, Tshuma N, Kagura J. The relationship between menstrual hygiene management, practices, and school absenteeism among adolescent girls in Johannesburg, South Africa. South Afr J Child Health. 2022;16(1):7–12. https://doi.org/10.7196/SAJCH.2022.v16i1.1803.
16. Sindila N. *An Evaluation of The Effects of Period Poverty on Girl's/Women Productivity in Zambia: A Case of Namwandwe and Kapesha Townships In Mansa District* (Doctoral dissertation, Cavendish University). (2021) http://192.168.1.248:8080/xmlui/handle/123456789/954
17. Ministry of General Education. Menstrual Hygiene Management. National Guidelines. Menstrual Hygiene Matters. (2016). https://www.edu.gov.zm/wp-content/uploads/2023/02/MHM-Guidelines_Zambia.pdf
18. Ministry of General Education. Water, Sanitation and Hygiene in Schools (WinS). National Standards & Guidelines Mitigation and Localization. (2020). https://www.edu.gov.zm/wp-content/uploads/2023/02/MoGE-Water-Sanitation-Hygiene-in-Schools-WinS_12Nov2020-002.pdf
19. Ministry of General Education. Education Statistics Bulletin. Directorate of Planning and Information. (2020) https://www.edu.gov.zm/wp-content/uploads/2023/01/EDUCATION-STATISTICS-BULLETIN-2020.pdf
20. Kpodo L, Aberese-Ako M, Axame WK, Adjuik M, Gyapong M. Socio-cultural factors associated with knowledge, attitudes and menstrual hygiene practices among Junior High School adolescent girls in the Kpando district of Ghana: a mixed method study. PLoS ONE. 2022;17(10):e0275583. https://doi.org/10.1371/journal.pone.0275583.
21. Macleod CI, Du Toit R, Paphitis S, Kelland L. Social and structural barriers related to menstruation across diverse schools in the Eastern Cape. South Afr J Educ. 2020;40(3):1–9. https://doi.org/10.15700/saje.v40n3a1663.
22. Vashisht A, Pathak R, Agarwalla R, Patavegar BN, Panda M. School absenteeism during menstruation amongst adolescent girls in Delhi, India. J Family Community Med. 2018;25(3):163–8. https://doi.org/10.4103/jfcm.JFCM_161_17.
23. Jere J. *Focus on Menstrual Health Keeps Zambian Girls in School*. VOA. (2019, October 17). https://www.voanews.com/a/africa_focus-menstrual-health-keeps-zambian-girls-school/6177759.html
24. Mutunda Lahme A, Stern R. Factors that affect menstrual hygiene among adolescent schoolgirls: a case study from Mongu District, Zambia. Women's Reproductive Health. 2017;4(3):198–211. https://doi.org/10.1080/23293691.2017.1388718.
25. National Assembly of Zambia. Ministerial Statement by Minister of Finance. (2019). https://www.parliament.gov.zm/node/8971
26. Levy PS, Lemeshow S. Sampling of populations: methods and applications. John Wiley& Sons; 2013 Jun 7. https://books.google.com/books?hl=en-lr=-id=XU9ZmLe5k1IC-oi=fnd-pg=PT14-dq=Levy-26-Lemeshow,-ots=od7WKaQCTq-sig=cOwXtuHJUIweCRpm7SKIsn5zlzQ
27. Lohr SL. Sampling: design and analysis., Chapman. and Hall/CRC; 2021 Nov 29. https://www.taylorfrancis.com/books/mono/10.1201/9780429298899/sampling-sharon-lohr
28. Deshpande TN, Patil SS, Gharai SB, Patil SR, Durgawale PM. Menstrual hygiene among adolescent girls–A study from urban slum area. J Family Med Prim care. 2018;7(6):1439–45. https://doi.org/10.4103/jfmpc.jfmpc_80_18.

29. Sharma S, Deuja S, Saha CG. Menstrual pattern among adolescent girls of Pokhara Valley: a cross sectional study. BMC Womens Health. 2016;16:1–6. https://doi.org/10.1186/s12905-016-0354-y.
30. Bachloo T, Kumar R, Goyal A, Singh P, Yadav SS, Bhardwaj A, Mittal A. A study on perception and practice of menstruation among school going adolescent girls in district Ambala Haryana, India. Int J Community Med Public Health. 2016;3(4):931–7. https://doi.org/10.18203/2394-6040.ijcmph20160931.
31. Deardorff J, Abrams B, Ekwaru JP, Rehkopf DH. Socioeconomic status and age at menarche: an examination of multiple indicators in an ethnically diverse cohort. Ann Epidemiol. 2014;24(10):727–33. https://doi.org/10.1016/j.annepidem.2014.07.002.
32. Funmito FO, Fehintola AO, Aremu AO, Idowu A, Ogunlaja OA, Ogunlaja IP. Assessment of knowledge, attitude and practice about menstruation and menstrual hygiene among secondary high school girls in Ogbomoso, Oyo state, Nigeria. Int J Reprod Contracept Obstet Gynecol. 2017;6(5):1726–32. https://doi.org/10.18203/2320-1770.ijrcog20171932.
33. Dasgupta A, Sarkar M. Menstrual Hygiene: how hygienic is the adolescent girl? Indian J Community Medicine: Official Publication Indian Association Prev Social Med. 2008;33(2):77–80. https://doi.org/10.4103/0970-0218.40872.
34. Tiwari H, Oza UN, Tiwari R. Knowledge, attitudes and beliefs about menarche of adolescent girls in Anand district, Gujarat. EMHJ-Eastern Mediterranean Health Journal, 12 (3–4), 428–433, 2006. 2006.
35. Patavegar BN, Kapilashrami MC, Rasheed N, Pathak R. Menstrual hygiene among adolescent school girls: an in-depth cross-sectional study in an urban community. Int J Health Sci Res. 2014;4(11):15–21.
36. Das P, Baker KK, Dutta A, Swain T, Sahoo S, Das BS, Panda B, Nayak A, Bara M, Bilung B, Mishra PR. Menstrual hygiene practices, WASH access and the risk of urogenital infection in women from Odisha, India. PLoS ONE. 2015;10(6):e0130777. https://doi.org/10.1371/journal.pone.0130777.
37. Elledge MF, Muralidharan A, Parker A, Ravndal KT, Siddiqui M, Toolaram AP, Woodward KP. Menstrual hygiene management and waste disposal in low- and middle-income countries—a review of the literature. Int J Environ Res Public Health. 2018;15(11):2562. https://doi.org/10.3390/ijerph15112562.
38. Paria B, Bhattacharyya A, Das S. A comparative study on menstrual hygiene among urban and rural adolescent girls of West Bengal. J Family Med Prim care. 2014;3(4):413–7. https://doi.org/10.4103/2249-4863.148131.
39. Crankshaw TL, Strauss M, Gumede B. Menstrual health management and schooling experience amongst female learners in Gauteng, South Africa: a mixed method study. Reproductive Health. 2020;17:1–5. https://doi.org/10.1186/s12978-020-0896-1.
40. Garg S, Anand T. Menstruation related myths in India: strategies for combating it. J Family Med Prim care. 2015;4(2):184–6. https://doi.org/10.4103/2249-4863.154627.
41. Mukherjee A, Lama M, Khakurel U, Jha AN, Ajose F, Acharya S, Tymes-Wilbekin K, Sommer M, Jolly PE, Lhaki P, Shrestha S. Perception and practices of menstruation restrictions among urban adolescent girls and women in Nepal: a cross-sectional survey. Reproductive Health. 2020;17:1–0. https://doi.org/10.1186/s12978-020-00935-6.
42. Syed Abdullah SZ. Menstrual food restrictions and taboos: a qualitative study on rural, resettlement and urban indigenous Temiar of Malaysia. PLoS ONE. 2022;17(12):e0279629. https://doi.org/10.1371/journal.pone.0279629.
43. Gottlieb A. Menstrual taboos: moving beyond the curse. Palgrave Handb Crit Menstruation Stud. 2020;143–62. https://doi.org/10.1007/978-981-15-0614-7_14.
44. Kaur R, Kaur K, Kaur R. Menstrual hygiene, management, and waste disposal: practices and challenges faced by girls/women of developing countries. J Environ Public Health. 2018;2018(1):1730964. https://doi.org/10.1155/2018/1730964.
45. Dudeja P, Sindhu A, Shankar P, Gadekar T. A cross-sectional study to assess awareness about menstruation in adolescent girls of an urban slum in western Maharashtra. Int J Adolesc Med Health. 2018;30(4):20160079. https://doi.org/10.1515/ijamh-2016-0079.

Publisher's note

Bwalya Bupe Bwalya Is a Lecturer of Demography at Mulungushi University in the School of Social Sciences, Economics Department, in Kabwe District of Zambia. Currently, BBB is pursuing a Doctor of Philosophy in Demography and Population Studies at University of the Witwatersrand, Schools of Public Health and Social Science in Johannesburg, South Africa.

Ancietos Mwansa Is a Lecturer of International Relations in the School of Social Sciences, Political and Administrative Studies Department, in Kabwe District of Zambia.

Patrick Amanzi Is a Demographer and Epidemiologist currently working as a Chief Executive Officer for Health Information Systems Programme, Lusaka, Zambia.

Christabel Ngongola Is a Lecturer of Economics at Mulungushi University in the School of Social Sciences, Economics Department, in Kabwe District of Zambia.

Charity Meki-Kombe Is a Lecturer of Educational Policy at Mulungushi University in the School of Education, in the Department of Languages, Social, Natural Sciences and Education, in Kabwe District of Zambia.